Claims

1. A method of reducing systematic errors in grating writing in an optical waveguide, the method comprising the steps of:

a) numerically designing a theoretical test grating structure for desired spectral characteristics,

b) writing a test grating structure experimentally and according to the theoretical test grating structure design,

c) measuring the actual spectral characteristics of the test grating structure,

d) reconstructing an actual design of the test grating structure from the actual spectral characteristics, and

e) writing a compensated grating structure using a compensated design based on a comparison of the initial numerical design with the actual design of the test grating.

2. A method as claimed in claim 1, wherein the step of reconstructing the actual design comprises solving an inverse scattering problem based on the measured actual spectral characteristics.

3. A method as claimed in claim 2, wherein the solving of the inverse scattering problem comprises utilising a layer-peeling algorithm.

4. A method as claimed in claim 1, wherein the compensated grating structure is based on a different theoretical grating structure than the theoretical test grating structure.

5. A method as claimed in claim 1, wherein the comparison of the actual with the initial numerical design comprises subtracting deviations of the actual from the numerical design from the numerical design to form the compensated design.

6. A method as claimed in claim 5, wherein the deviations are filtered from high frequency components.

7. A method as claimed in claim 1, wherein the comparison of the actual with the initial numerical design comprises multiplying the theoretical test grating function with a ratio of the theoretical test grating function and the actual test grating function.

8. A method as claimed in claim 1, wherein the step of measuring the actual spectral characteristics comprises measuring the actual spectral characteristics of the test grating from both ends thereof.

9. A method as claimed in claim 8, wherein the step of reconstructing the actual design comprises utilising different weighting factors for the different end reconstructions of the test grating to form the reconstructed actual design.

10. A method as claimed in claim 8, wherein the step of reconstructing the actual design comprises substantially a half-sum of different end reconstructions of the test grating.

11 A method as claimed in claim 1, wherein steps c) to e) are repeated, wherein the compensated design structure takes on the role of the test grating structure.

12. A method as claimed in claim 11, wherein the steps c) to e) are repeated until a desired accuracy is achieved or no further improvement in the accuracy is found.

13. A method as claimed in claim 1, wherein the steps of writing the test grating and the compensated grating comprise utilising an interferometer for inducing refractive index changes in the waveguide to form the test and the compensated grating structures.

14. A method as claimed in claim 1, wherein the waveguide is in the form of an optical fibre or a planar waveguide.

15 A method of writing a grating structure in an optical waveguide, the method comprising the step of utilising compensation information gained from conducting the steps of :

a) numerically designing a theoretical grating test structure for desired spectral characteristics,

b) writing a test grating structure experimentally and according to the theoretical test grating structure design,

c) measuring the actual spectral characteristics of the test grating structure,

d) reconstructing an actual design of the test grating structure from the actual spectral characteristics.

16. A method as claimed in claim 15, wherein the compensation information is provided in the form of stored compensation data previously obtained for a particular grating writing arrangement.

17. An arrangement for grating writing in an optical waveguide, the arrangement comprising a processing means arranged, in use, to control the writing of a grating structure based on a theoretical grating design and compensation data obtained for the arrangement to compensate for systematic errors.

18. An arrangement as claimed in claim 17, wherein the compensation data is of a type obtained from conducting the steps of:

a) numerically designing a theoretical grating test structure for desired spectral characteristics.

b) writing a test grating structure experimentally and according to the theoretical test grating structure design,

c) measuring the actual spectral characteristics of the test grating structure,

d) reconstructing an actual design of the test grating structure from the actual spectral characteristics.

19. A waveguide structure incorporating a grating written utilising a method or arrangement as claimed in claim 1.

20. A waveguide structure incorporating a grating written utilising a method or arrangement as claimed in claim 17.